

Exponent :

A number or symbol, as 3 in $(+y)^3$, placed to the right of and above another number, symbol, or expression, denoting the power to which that number, symbol, or expression is to be raised. Also called *exponent*.

adj. $2^3 = 2 \times 2 \times 2$

Reads: 2 to the 3rd power.
2 times itself
3 times.

$$2 \times 2 = 4$$

$$4 \times 2 = 8$$

$$2^3 = 8$$

$10^0 = 1$ * any number raised to the zero power is 1

Example: $5^0 = 1$

$$\text{Mr. Kramer}^0 = 1$$

$$7 \text{ billion}^0 = 1$$

$10^1 = 10$ * any number raised to the 1st power is that number

Examples: $4^1 = 4$

$$\text{Mr. Kramer}^1 = \text{Mr. Kramer}$$

$$93,000,000^1 = 93 \text{ million}$$

POWERS of TEN

$$10^0 = 1$$

$$10^1 = 10$$

$$10^2 = 10 \times 10 = 100$$

$$10^3 = 10 \times 10 \times 10 = 1,000$$

*notice that the exponent corresponds with the number of zeros that follow the one

Examples: $10^6 = 1,000,000$

$$10 \times 10 \times 10 \times 10 \times 10 \times 10$$

names of large numbers

$$10^6 = 1,000,000 = \text{one million}$$

$$10^9 = 1,000,000,000 = \text{one billion}$$

$$10^{12} = 1,000,000,000,000 = \text{one trillion}$$

$$10^{15} \rightarrow \text{one quadrillion}$$

$$10^{18} \rightarrow \text{one quintillion}$$

$$10^{21} \rightarrow \text{one sextillion}$$

$$10^{24} \rightarrow \text{one septillion}$$

$$10^{27} \rightarrow \text{one octillion}$$

$$10^{30} \rightarrow \text{one nonillion}$$

$$10^{33} \rightarrow \text{one decillion}$$

$$10^{36} \rightarrow \text{one undecillion}$$

$$10^{39} \rightarrow \text{one duodecillion}$$

$$10^{42} \rightarrow \text{one duotrigintillion}$$

$$10^{100} \xrightarrow{\text{1 followed by 100 zeros}} \text{googol}$$

$$10^{\text{googol}} \xrightarrow{\text{1 followed by a googol zeros}} \text{googolplex}$$

Negative Exponents

$$b^{-m} = \frac{1}{b^m}$$

* negative exponents or powers do not mean negative numbers.

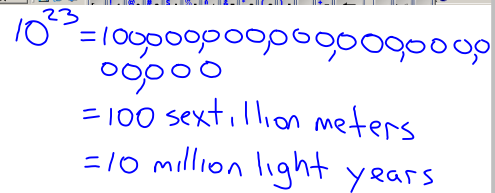
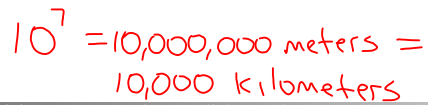
* these numbers are smaller than one and approach zero.

$$10^{-2} = \frac{1}{10^2} = \frac{1}{100} = .01 = 1\%$$

$$2^{-3} = \frac{1}{2^3} = \frac{1}{2*2*2} = \frac{1}{8} = .125 = 12.5\%$$

$$4^{-2} = \frac{1}{4^2} = \frac{1}{4*4} = \frac{1}{16} = .0625 = 6.25\%$$

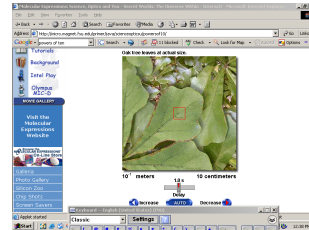
$10^0 \text{ meters} = 1 \text{ meter}$



Viewing a leaf from 1 meter
to 10^{-16} meters

$$10^{-1} = \frac{1}{10^1} = \frac{1}{10} \text{ meters}$$

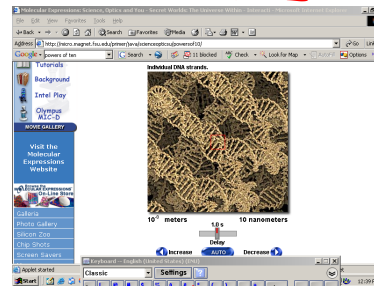
or 10 centimeters



$$10^{-8} = \frac{1}{10^8} = \frac{1}{100,000,000}$$

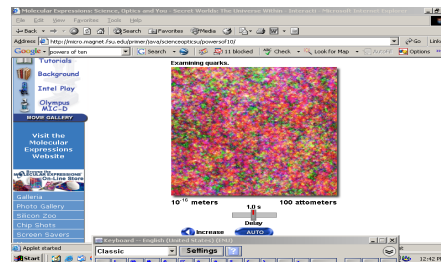
= one hundred millionth of a meter

= 10 nanometers



$$10^{-16} = \frac{1}{10^{16}} = \frac{1}{10,000,000,000,000,000}$$

1, 0 quadrillionth of a meter



Practice Questions

(key on next
page)

1. $1^5 =$

2. $2^6 =$

3. $10^9 =$

4. $3^3 =$

5. $4^4 =$

6. $7^{-2} =$

7. $10^{-3} =$

8. $2^{-8} =$

9. $8^0 =$

10. $150' =$

Practice Questions

Key

1. $1^5 = 1 \times 1 \times 1 \times 1 \times 1 = 1$
2. $2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$
3. $10^9 = 1,000,000,000 = 1 \text{ billion}$
4. $3^3 = 3 \times 3 \times 3 = 27$
5. $4^4 = 4 \times 4 \times 4 \times 4 = 256$
6. $7^{-2} = \frac{1}{7^2} = \frac{1}{49}$
7. $10^{-3} = \frac{1}{10^3} = \frac{1}{1,000} = .001$
8. $2^{-8} = \frac{1}{2^8} = \frac{1}{256}$
9. $8^0 = 1$
10. $150^1 = 150$